

HMI-640S

486-based panel PC with 6.0" LCD
flat panel display

User's Manual

Copyright notice

This document is copyrighted 2000 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to make improvements to the products described in this manual at any time without notice.

No part of this manual may be reproduced, copied, translated or transmitted in any form or by any means without the prior written permission of Advantech Co., Ltd. Information provided in this manual is intended to be accurate and reliable. However, Advantech Co., Ltd assumes no responsibility for its use, nor for any infringements upon the rights of third parties which may result from its use.

Acknowledgments

HMI-640S, CPC-2245N, CPC-2430, CPC-2520 and CPC-2900 are all trademarks of Advantech Co., Ltd. IBM, PC/AT, and PS/2 are trademarks of International Business Machines Corporation. MS-DOS and Windows CE are trademarks of Microsoft Corporation. All other brand and product names mentioned herein are trademarks or registered trademarks of their respective holders.

Part No. 2008064000

1st Edition Printed in Taiwan Feb 2000

FCC Class A notes

This equipment has been tested with a class A computing device and has been found to comply with part 15 of FCC Rules. Operation in a residential area may cause unacceptable interference to radio and TV receptions requiring the operator to take whatever steps are necessary to correct the interference.

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this installation reference guide for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Do not use liquid or spray detergents for cleaning. Use a damp cloth.
4. For pluggable equipment, the power outlet must be installed near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall could cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. **DO NOT COVER THE OPENINGS.**
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient over-voltage.
12. Never pour any liquid into an opening. This could cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If any of the following situations arises, get the equipment checked by service personnel:
 - a. The power cord or plug is damaged.
 - b. Liquid has penetrated into the equipment.
 - c. The equipment has been exposed to moisture.
 - d. The equipment does not work well, or you cannot get it to work according to the installation reference guide.
 - e. The equipment has been dropped and damaged.
 - f. The equipment has obvious signs of breakage.
15. **DO NOT LEAVE THIS EQUIPMENT IN AN UNCONTROLLED ENVIRONMENT WHERE THE STORAGE TEMPERATURE IS BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). IT MAY DAMAGE THE EQUIPMENT.**

The sound pressure level at the operator's position according to IEC 704-1:1982 is equal to or less than 70 dB(A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Wichtige Sicherheitshinweise

1. Bitte lesen Sie sich diese Hinweise sorgfältig durch.
 2. Heben Sie diese Anleitung für den späteren Gebrauch auf.
 3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Verwenden Sie keine Flüssig- oder Aerosolreiniger. Am besten dient ein angefeuchtetes Tuch zur Reinigung.
 4. Die Netzanschlußsteckdose soll nahe dem Gerät angebracht und leicht zugänglich sein.
 5. Das Gerät ist vor Feuchtigkeit zu schützen.
 6. Bei der Aufstellung des Gerätes ist auf sicheren Stand zu achten. Ein Kippen oder Fallen könnte Verletzungen hervorrufen.
 7. Die Belüftungsöffnungen dienen zur Luftzirkulation die das Gerät vor Überhitzung schützt. Sorgen Sie dafür, daß diese Öffnungen nicht abgedeckt werden.
 8. Beachten Sie beim Anschluß an das Stromnetz die Anschlußwerte.
 9. Verlegen Sie die Netzanschlußleitung so, daß niemand darüber fallen kann. Es sollte auch nichts auf der Leitung abgestellt werden.
 10. Alle Hinweise und Warnungen die sich am Geräten befinden sind zu beachten.
 11. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
 12. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. elektrischen Schlag auslösen.
 13. Öffnen Sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von autorisiertem Servicepersonal geöffnet werden.
 14. Wenn folgende Situationen auftreten ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:
 - a. Netzkabel oder Netzstecker sind beschädigt.
 - b. Flüssigkeit ist in das Gerät eingedrungen.
 - c. Das Gerät war Feuchtigkeit ausgesetzt.
 - d. Wenn das Gerät nicht der Bedienungsanleitung entsprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesserung erzielen.
 - e. Das Gerät ist gefallen und/oder das Gehäuse ist beschädigt.
 - f. Wenn das Gerät deutliche Anzeichen eines Defektes aufweist.
 15. Bitte lassen Sie das Gerät nicht unbehebt hinten unter -20° C (-4° F) oder oben 60° C (140° F), weil diesen Temperaturen das Gerät zerstören könnten.
- Der arbeitsplatzbezogene Schalldruckpegel nach DIN 45 635 Teil 1000 beträgt 70dB(A) oder weniger.

DISCLAIMER: This set of instructions is provided according to IEC704-1. Advantech disclaims all responsibility for the accuracy of any statements contained therein.

Contents

Chapter 1 General Information	1
1.1 Introduction.....	2
1.2 Specifications	2
General	2
Standard functions (CPC-2245N)	2
Ethernet interface	4
SVGA/Flat panel interface (CPC-2520)	4
Power supply	4
Environmental specifications	4
Touchscreen	5
1.3 LCD Specifications.....	5
1.4 I/O Arrangement	6
1.5 Total Solution	7
1.6 Dimensions	8
1.7 Mounting	9
Chapter 2 System Setup	11
2.1 General	12
2.2 Packing List	12
2.3 Initial Setup	13
2.3 Installing a CompactFlash Memory Card	14
Installing a CompactFlash adapter	14
Installing a 2.5" HDD	15
HMI-640S is designed as a HDD-less platform of a high reliability. However, if a HDD should be used, its installation procedure is described as follows:	15
2.4 Connecting the Power Adapter	16
2.5 Installing a PC/104 Module	17
2.6 First System Boot	19
Power up for the first time	19
Assign the Device Name	19
2.7 Exploded Diagram	20

Chapter 3 Maintenance	21
3.1 Removing the Front/Rear Panel	22
3.2 LCD Display	24
3.3 LCD Backlight	25
3.4 Power Supply	26
3.5 I/O Adapter (CPC-2900)	27
3.6 Core of HMI-640S (CPC-2520/CPC-2245N/CPC-2430)	28
Chapter 4 CPC-2245N Main Board	29
4.1 Introduction	30
4.2 Specifications	31
ISA/IDE/FDD/parallel port (144-pin SODIMM socket) ...	31
VGA/LAN/serial port/keyboard/mouse (40-pin FPC connector)	32
Mechanical and environmental	32
4.3 Board layout: dimensions	33
4.4 Jumpers and connectors	34
4.5 Board layout: jumper/connector locations	35
4.6 Safety precautions	36
4.7 Setting jumpers	37
4.7.1 Clear CMOS (J2)	38
4.8 CompactFlash interface (CN2)	38
4.9 ISA/IDE/floppy drive/parallel port (CN3)	39
4.9.1 ISA bus	42
4.9.2 IDE interface	46
4.9.3 Floppy drive	48
4.9.4 Parallel port	49
4.10 VGA/LAN/serial ports/keyboard/mouse (CN4)	50
4.10.1 VGA interface	51
4.10.2 Ethernet configuration	52
4.10.3 Keyboard and PS/2 mouse connector	52
Table 4-15: PS/2 mouse connector	53
4.10.4 Serial ports	53
4.11 Power supply connector (CN5)	55

4.12	Card installation	56
4.13	Card removal	57
4.14	FPC cable installation	58
Chapter 5 CPC-2520 VGA/LCD Control Board		59
5.1	Introduction	60
5.2	Specifications	61
	General	61
	Mechanical and environmental	61
5.3	Board layout: dimensions	62
5.4	Jumpers and connectors	63
5.5	Board layout: jumper/connector locations	64
5.6	Safety precautions	65
5.7	Jumper settings	66
5.8	LCD panel select (SW1)	67
5.9	Display connectors (CN2, CN3)	67
5.10	LCD display connector (CN2)	68
5.11	VGA display connector (CN3)	69
5.12	FPC cable installation	71
Chapter 6 Networking Communication		73
6.1	Introduction	74
6.2	Networking via LAN	74
6.2	Networking via RS-232	76
6.3	Simple Networking via a Hub	77
Chapter A Cabling for RS-232 Port		79
Chapter B DIP Switch Settings		83
B.1	Touchscreen Specifications	84

Figures

Figure 4-1: Board layout: jumper/connector locations	35
Figure 4-2: Damping resistor	47

Tables

Table 4-1: Jumpers and connectors	34
Table 4-2: Clear CMOS (J2)	38
Table 4-3: ISA/IDE/floppy drive/parallel port connector (CN3)	40
Table 4-4: ISA bus - CN3 cross reference table (ISA pin A)	42
Table 4-5: ISA bus - CN3 cross reference table (ISA bus pin B)	43
Table 4-6: ISA bus - CN3 cross reference table (ISA bus pin C)	44
Table 4-7: ISA bus - CN3 cross reference table (IDE pin D)	45
Table 4-8: IDE hard drive connector	46
Table 4-9: Floppy drive connector	48
Table 4-10: Parallel port connector	49
Table 4-11: FPC connector (CN4)	50
Table 4-12: VGA interface	51
Table 4-13: Ethernet configuration	52
Table 4-14: PS/2 keyboard connector	53
Table 4-15: PS/2 mouse connector	53
Table 4-16: Serial port default settings	54
Table 4-17: COM1 RS-232 serial port connector	54
Table 4-18: COM2 RS-232 serial port connector	54
Table 4-19: Power supply connector (CN5)	55
Table 5-1: Jumpers and connectors	63
Table 5-2: LCD display connector (CN2)	68
Table 5-3: VGA display connector (CN3)	69
Table 5-4: VGA display connector (CN3)	70

CHAPTER 1

General Information

This chapter gives background information on the HMI-640S.

Sections include:

- Introduction
- Specifications
- LCD Specifications
- I/O Arrangement
- Total Solution
- Dimensions
- Mounting

1.1 Introduction

The HMI-640S meets all of the requirements necessary to serve as an industrial operator interface. This panel PC provides an all-in-one 486 PC platform with 6.0" STN color LCD display, on-board VGA, two COM ports (one RS-232, one RS-232/422/485), one removable CompactFlash adapter, an external 16-bit PC/104 expansion slot and a touchscreen. The heart of the HMI-640S is a general-purpose miniature computer that is suitable for a variety of applications.

The HMI-640S is suitable for various industry applications, including factory automation, automated production lines, precision machinery, production process control, environmental control, terminal information system and entertainment management system. HMI-640S is a reliable, cost-effective solution to your application's processing requirements.

The HMI-640S offers optional HMI software package, which is pre-installed on the CompactFlash card. All that user has to do is insert the CompactFlash card into the adapter box on the machine, and turn on the power. For more details, please contact your local Advantech distributors or our branch office.

1.2 Specifications

General

- **Construction:** Plastic molding with an optional PC/104 metal cover
- **Dimensions (W x H x D):** 197.5 x 142.8 x 63.4 mm
(7.76" x 5.61" x 2.49")
- **Weight:** 1.5 kg (3.3 lb)

Standard functions (CPC-2245N)

- **CPU with core logic:** STPC Client 66MHz, which is equivalent to 66 MHz 80486 CPU
- **BIOS:** Award 256 KB Flash BIOS

- **RAM:** 16MB EDO RAM on board
- **IDE hard disk drive interface:** Supports up to two Enhanced IDE devices, auto-detect BIOS
- **Multi-mode parallel port:** Configured to LPT1, LPT2, LPT3 or disabled. Supports SPP/EPP/ECP; D-SUB 25-pin connector (on I/O module)
- **Serial ports:** One serial RS-232 port, one serial RS-232/422/485 port (configurable by DIP switches; please refer to Appendix B).
- **PS/2 keyboard/mouse connector:** Mini-DIN keyboard connector
- **Watchdog timer:** Generates a system reset at a fixed 1.6-second interval. Watchdog timer can be enabled/disabled through software. The Watchdog timer is disabled by default factory setting.
- **External expansion slot:** 104-pin connector, supports up to two cascaded 16-bit PC/104 cards with +5 V and +12 V
- **Battery:** 3 V @ 195 mA Lithium battery for CMOS backup

Ethernet interface

- **Chipset:** Realtek RTL8139A 10/100 Base-T controller
- **Network (LAN):** Novell NE1000/2000 compatible. Supports both boot ROM function and software drivers

SVGA/Flat panel interface (CPC-2520)

- **Chipset:** C&T 69000
- **Display memory:** 2 MB SDRAM embedded
- **Hardware Windows acceleration:** 32-bit graphic engine. Hardware line drawing and 64 x 64 x 2 hardware cursor
- **Resolution:**
640 x 480 @ 16M colors
800 x 600 @ 16M colors
1024 x 768 @ 64K colors

Note: The resolution and hardware Windows acceleration function of the flat panel interface is partially dependent on the resolution of the flat panel.

Power supply

- **Output rating:** 25 W
- **Input voltage:** 18 ~ 30 V_{DC}
- **Output voltage:** +5 V @ 4 A, +12 V @ 0.5 A

Environmental specifications

- **Operating temperature:** 0 ~ 45°C (32° ~ 113°F)
- **Relative humidity:** 0 ~ 95% RH (non-condensing), 40° C
- **Safety:** Meets UL/CSA
- **FCC Class A, CE certified**
- **Vibration:** 10 ~ 18 Hz, 1.5 mm peak-to-peak displacement
18 ~ 500 Hz, 1 G acceleration

Touchscreen

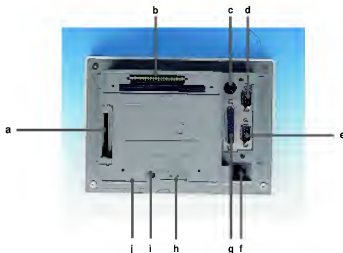
- **Type:** Resistive
- **Resolution:** 1024 x 1024
- **Light transmission:** 75%
- **Software driver:** HMI-640S supports both DOS and Windows CE
- **Lifetime:** More than 3 million touches

1.3 LCD Specifications

Model	HMI-640S
Display type	STN color LCD
Max. colors or grayscales	256 colors
Size	6.0"
LCD model	KCB060VG1CA-A21 or compatible
Resolution	640 x 480 (VGA)
Brightness	70 cd/m ²
Dot size (W x H)	0.043 x 0.169
Viewing angle	90°
Operating Temperature	0 ~ 50° C
LCD MTBF	62,000 hours
Backlight MTBF	10,000 hours

1.4 I/O Arrangement

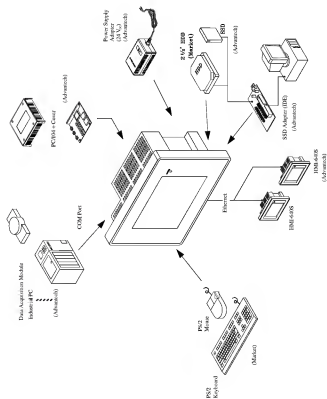
The I/O arrangement of the HMI-640S is shown below:



- | | |
|--------------------------------------|---|
| a. IDE connector | f. Ethernet port |
| b. PC/104 slot | g. Parallel port |
| c. PS/2 keyboard and mouse connector | h. 24 V _{DC} input connector & chassis GND |
| d. Serial COM2 port | i. LCD contrast |
| e. Serial COM1 port | j. Slide power switch |

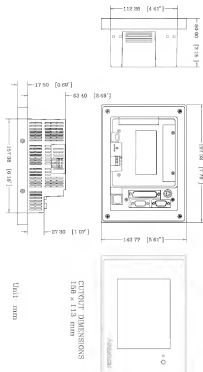
Note: *Serial port COM2 can be configured to operate in RS-232, RS-422 or RS-485 mode. This is set by DIP switches on the upper side of the back cover. Before attaching connectors, please make sure the DIP switch settings are correct. (See Appendix B for COM2 port settings.)*

1.5 Total Solution



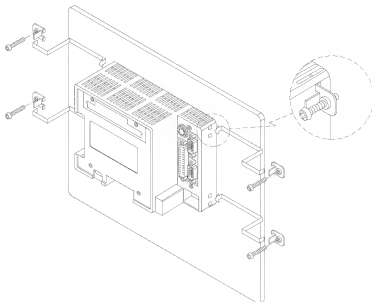
1.6 Dimensions

The HMI-640S can be placed on a shelf or a table, or mounted onto a panel. Cutout panel dimensions are as follows:



1.7 Mounting

If you want to panel mount your HMI-640S, use the four brackets that are included within your package. First, fit the HMI-640S body onto the cutout panel and hold it temporarily in place with your hands. Then, insert each bracket into the four keyholes on both sides of the HMI-640S rear case, and use appropriate screws to fix the HMI-640S body on the cutout panel.



CHAPTER 2

System Setup

This chapter explains how to set up the HMI-640S hardware.

Sections include:

- General
- Packing List
- Initial Setup
- Installing a CompactFlash memory card
- Connecting the Power Adapter
- Installing a PC/104 Module
- First System Boot
- Exploded Diagram

2.1 General

The HMI-640S compact profile panel PC can simultaneously monitor and sample the data from several traditional PLC controllers. It takes full advantage of a wide range of available software programs, and its upgrade can be performed both quickly and easily with the replacement of various optional modules.

The HMI-640S is easily customizable to fulfill your needs. The power supply and I/O adapter are all readily accessible by removing the front or rear panel.

Warning!  *Verify that power source has been disconnected from the HMI-640S before you install any of its components or accessories. Note that no power source should be attached to the HMI-640S during any hardware installation or servicing.*

2.2 Packing List

When you first receive your HMI-640S package, please check the packing list below to make sure you have all the necessary items that should come with your package:

- ☐ HMI-640S compact panel PC
- ☐ CompactFlash adapter box
- ☐ Power adapter
- ☐ User's Manual
- ☐ Service CD
- ☐ DB-9 null modem cable
- ☐ Accessory pack

If you have purchased additional software options, you should have optional items such as:

- ☐ 16 MB CompactFlash card pre-installed with specific software
- ☐ End User License Agreement (EULA) for Windows CE

2.3 Initial Setup

The HMI-640S offers an easy setup feature: It takes merely 3 easy steps for your initial setup before use. Simply take out the HMI-640S from it's package and follow the steps below for a quick initial setup:

Step 1: Insert CompactFlash memory card (with Windows CE and/or specific application software inside) into the appropriate bus slot.

Step 2: Connect the power adapter cord to HMI-640S and plug the other end of the cord into the power outlet.

Step 3: Turn the sytem power on for the first boot.

Warning! *Before installing the serial port mouse driver, you must remove the PS/2 mouse driver from your system.*



Note: *The PS/2 mouse driver cannot be simultaneously installed with a serial/COM port mouse driver.*

Note: *It might be possible that you may see several light or dark dots on the LCD panel while system powers up. These minor imperfections actually originate from the LCD panel manufacturing process and will not affect the normal operation of your system in any way.*

2.3 Installing a CompactFlash Memory Card

Installing a CompactFlash adapter

1. Verify that the power source to the HMI-640S has been properly disconnected.
2. Insert the CompactFlash adapter firmly but gently into the IDE-compatible slot as shown in the picture below.
3. Make sure your CompactFlash memory card is inserted properly into place.

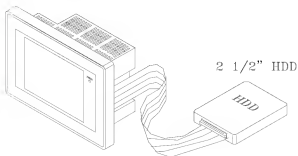


Installing a 2.5" HDD

HMI-640S is designed as a HDD-less platform of a high reliability. However, if a HDD should be used, its installation procedure is described as follows:

1. Verify that the power source to the HMI-640S has been properly disconnected.
2. Connect the HDD via a cable to the IDE-compatible slot on the HMI-640S. Make sure that you have inserted the cable connector properly into the slot.

Warning!  When connecting the cable to the HDD, make sure that pin 1 on the cable is connected to pin 1 on the connector of the HDD. Faulty or wrong connection might damage your HDD.

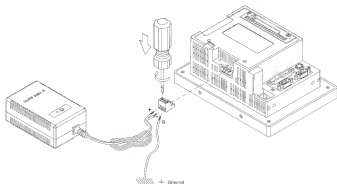


2.4 Connecting the Power Adapter

Before connecting the power adapter to your HMI-640S, you must first attach the Power Terminal Block onto the 24 V_{DC} power receptable located beneath the HMI-640S. After the Power Terminal Block has been attached, you can then connect the power adapter to the Power Terminal Block to provide power supplies to your HMI-640S.

To connect the power adapter:

1. Identify each wire of the power adapter cord (you must first make sure which is +, - or GND specifically).
2. Unscrew the screws on the power terminal. Insert each wire of the power adapter cord specifically into its designated connector hole (+, - and GND) on the Power Terminal Block. Fasten the screws to secure wires in the connector holes.



Warning! Avoid shorting any bare wires since it may cause damages to your system or device.

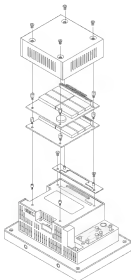


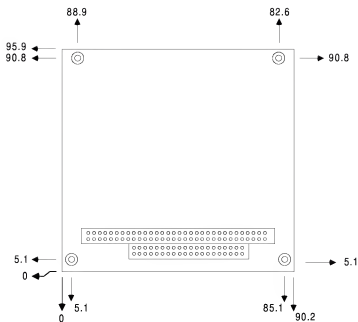
2.5 Installing a PC/104 Module

The HMI-640S's PC/104 connector gives you the flexibility to attach to the PC/104 expansion modules, which perform same functions as traditional plug-in expansion cards. Using these modules might save you space and valuable slots.

To install a PC/104 module:

1. Verify that the power source to the HMI-640S has been properly disconnected.
2. Detach the metal cover on the rear panel.
3. Plug the PC/104 module's male connectors into ISA expansion slot's female connectors by pressing the module firmly with caution.
4. Secure the two PC/104 modules onto the HMI-640S.





PC/104 module dimensions (mm $\pm 5\%$)

2.6 First System Boot

After you have properly installed the CompactFlash memory card pre-installed with Windows CE or even with specific application software, all you have to do is simply plug in the power and the system is ready for the first boot.

Power up for the first time

Please follow the steps below to perform your first system boot :

1. Turn on the power switch. Meanwhile, the Power LED on the front panel will light up.
2. The Windows CE operating system starts to boot from the CompactFlash memory.
3. Wait for a while for Windows CE to complete its first startup.

Assign the Device Name

After you have successfully booted for the first time, you can now assign a *Device Name* to your HMI-640S for network identification.

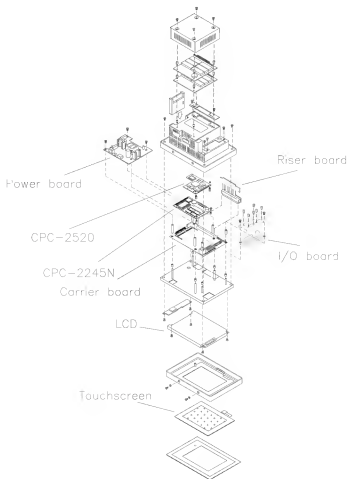
Follow the instructions below to assign the Device Name:

1. First Click *Start/Settings/Control Panel/Communication Properties* to access the *Communication Properties* page.
2. Select the *Device Name* tab on the properties page, and assign a *Device Name* to your HMI-640S. The Device Name is what comes to distinguish your HMI-640S within the network environment.
3. Click Ok to accept the *Device Name* setting.
4. Reboot your system to make your *Device Name* effective on the network.

After you have assigned a Device Name to your HMI-640S on the network, you can proceed further with other configurations or installation procedures if need be.

2.7 Exploded Diagram

The following exploded diagram is provided to help with assembly or disassembly of the HMI-640S.



CHAPTER 3

Maintenance

The HMI-640S is of a modular design so that it is convenient for users to maintain or service its internal components. This chapter will describe the disassembling process for the machine.

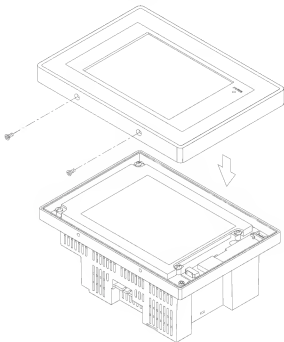
Sections include:

- Removing the Front/Rear Panel
- LCD Display
- LCD Backlight
- Power Supply
- I/O Adapter (CPC-2900)
- Core of HMI-640S (CPC-2520/-2245N/-2430)

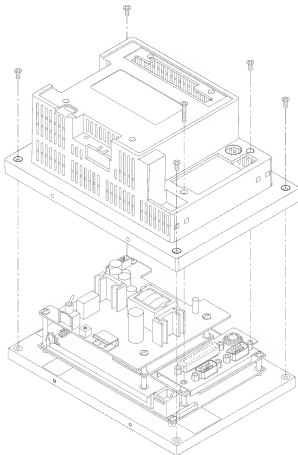
The HMI-640S is of a modular design so that it is convenient for users to maintain or service its internal components. This chapter will describe the disassembling process for the machine. The Service CD bundled in the HMI-640S package provides even more details for your reference.

3.1 Removing the Front/Rear Panel

You need only to remove the front panel of your HMI-640S to replace its LCD or backlight. To remove the front panel, first verify the power source to the HMI-640S has been disconnected. Next, remove the two screws found on the underside of the front panel. Pinch a corner of the front panel up with one hand, and then pull the other corner of the front panel firmly outward to remove the front panel.



You need only to remove the rear panel to replace the DRAM, power supply, I/O adapter, and certain components. To remove the rear panel, first verify that the power source to the HMI-640S has been disconnected. Then remove the six screws on the rear panel and pull it away from the HMI-640S main body.

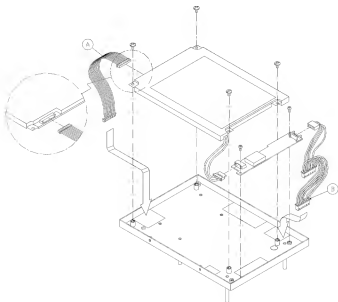


3.2 LCD Display

The LCD display rarely needs replacing during normal life span of the HMI-640S.

However, if you should need to replace the LCD display, please follow the procedure below:

1. Verify that the power source to the HMI-640S has been disconnected.
2. Open the front panel. (See Section 3.1.)
3. Remove the LCD from the steel chassis by first removing the four screws.
4. Disconnect the cable from the LCD (marked "A" in the diagram below) and the LCD inverter (marked "B").

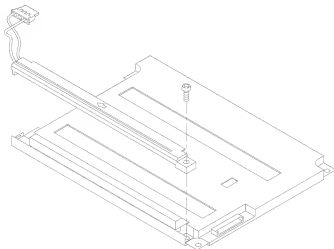


3.3 LCD Backlight

To replace the backlight:

1. Verify that the power source to the HMI-640S has been disconnected.
2. Open the front panel. (See Section 3.1.)
3. Remove the LCD from the steel chassis.
4. Disconnect the cables from the LCD and the LCD inverter.
5. Remove the screw that attaches the LCD backlight to the LCD display. Pull the backlight out horizontally.
6. To insert the backlight and reassemble the unit, just reverse the steps of the above procedure.

Warning: *The backlight is fragile. Use caution when handling or replacing it. It is recommended that the backlight repair or replacement should be done by qualified service personnel only.*

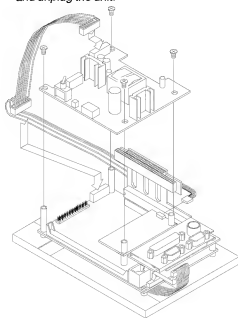


3.4 Power Supply

To repair or replace the power supply:

1. Verify that the power source to the HMI-640S has been disconnected.
2. Open the rear cover. (See Section 3.1)
3. Remove the four screws attaching the power supply to the CPU board.
4. Disconnect the cable from the power supply.
5. Replace the power supply and reassemble.

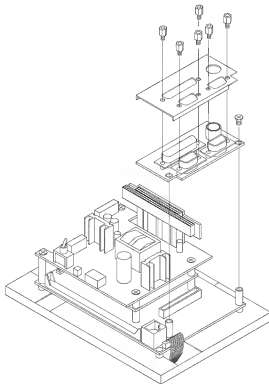
Warning: Shut off power to the HMI-640S before attempting to repair the power supply. Simply switch off the power and unplug the unit.



3.5 I/O Adapter (CPC-2900)

To replace or service the I/O adapter, follow these steps:

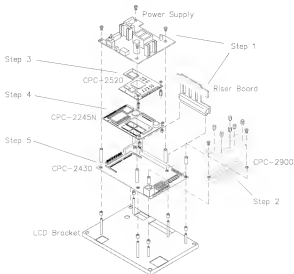
1. Verify that the power source to the HMI-640S has been disconnected.
2. Remove the rear cover. (See Section 3.1.)
3. Remove the screw which attaches the I/O adapter to the Carrier Board.
4. Replace the I/O adapter and reassemble the HMI-640S.



3.6 Core of HMI-640S (CPC-2520/CPC-2245N/CPC-2430)

The core of HMI-640S consists of CPC-2520 VGA/LCD control board, CPC-2245N main board and CPC-2430 carrier board. After removing power supply and I/O board as mentioned in previous sections, you can disassemble the other boards by the following steps:

1. Take off the riser board as you remove the power supply.
2. Take off the CPC-2900 I/O board as mentioned in last section.
3. Loosen the two nuts on the CPC-2520 VGA/LCD control board, and remove it from the main board beneath.
4. Loosen the two nuts on the CPC-2245N main board. Pull the two SO-DIMM latches outward, then the main board can be released from the SO-DIMM connector.
5. When all the boards above are removed, you can take off the CPC-2430 carrier board with ease.



CHAPTER 4

CPC-2245N Main Board

This chapter provides:

- Background information such as card specification and board layout of CPC-2245N.
- The installation procedures for CPC-2245N hardware, including instructions on setting jumpers and connecting peripherals, switches and indicators. Be sure to read all safety precautions before you begin the installation procedure.

4.1 Introduction

Advantech's new mini biscuit PC, the CPC-2245N, is truly an all-in one 486 processor-based single board computer. It comes equipped with 16 MB DRAM on board, an SVGA interface which supports CRT monitors with up to 4 MB display memory, a 10/100Base-T Ethernet interface, and a CompactFlash solid state-disk socket. In addition, it is equipped with two RS-232 serial ports, one bidirectional printer port which supports SPP, ECP and EPP modes, an IDE HDD interface, a floppy disk controller, as well as one ISA interface for functional expansion. With its industrial grade reliability, the CPC-2245N can operate continuously at temperatures up to 60° C (140° F). This compact unit offers all these functions within the space of a 2.5" hard disk drive (68 x 100 mm). All these numerous features provide an ideal price/performance solution for commercial and industrial applications where stability and reliability are essential.

The CPC-2245N mini biscuit PC's power can be supplied through a SODIMM socket or an on-board power connector. Thus, the CPC-2245N can be embedded into the user's system board, or used as a single board application. The ISA bus, HDD, FDD and parallel interface are connected to the user's system board via a SODIMM socket. This form factor has the benefits of easy maintenance. A damaged card can be replaced within 30 seconds. Furthermore, the mini biscuit PC is easily upgraded from 486 to Pentium® without the need to change the user's system board.

The CPC-2245N provides many useful functions in a tiny card. It reserves a small PCI connector for other extension modules, such as the CPC-2520 VGA/LCD module. It provides more flexible functions to satisfy all users' different application requirements.

The CPC-2245N is **small-sized, highly integrated, easy to maintain, easy to upgrade, and easy to install**. These features make it ideal for applications such as **small industrial controllers, panel PCs, security systems, Internet gateways, instruments, medical equipment, building automation**, and so on.

4.2 Specifications

- **CPU:** STPC Client, 66 MHz
- **On-card cache:** 8 KB
- **BIOS:** 256 KB Flash BIOS
- **Chipset:** STPC Client
- **Super I/O chipset:** Winbond W83977F
- **RAM memory:** 16 MB EDO RAM on board
- **Solid state disk:** Supports one CompactFlash card as an emulated HDD
- **Watchdog timer:** 1.6 sec. intervals

ISA/IDE/FDD/parallel port (144-pin SODIMM socket)

- **I/O expansion:** 16-bit AT-bus
- **Enhanced IDE hard disk drive interface:** Supports up to two hard disk drives. BIOS auto-detect
- **Floppy disk drive interface/multi-mode parallel port:** FDD interface and parallel port share the same connector. The FDD and/or parallel port can be switched in BIOS setup
 - FDD interface supports up to two floppy disk drives, 5.25" (360 KB and 1.2 MB) and/or 3.5" (720 KB, 1.44 MB and 2.88 MB)
 - Parallel supports SPP, ECP and EPP

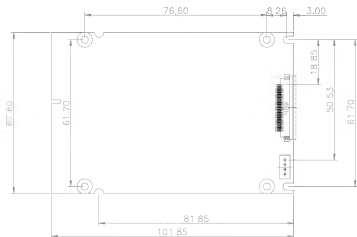
VGA/LAN/serial port/keyboard/mouse (40-pin FPC connector)

- **VGA with 64-bit windows accelerator**
 - Display memory:** 4 MB share memory architecture (UMA structure)
 - Display resolution:** 1280 x 1024 @ 64 K colors, 1024 x 768 @ 16 M colors
 - Automatically disables internal VGA if an external add-in VGA is plugged into the system
- **10/100Base-T Ethernet interface**
 - Chipset:** RTL-8139A PCI local bus Ethernet controller
 - Ethernet interface:** IEEE 802.3U compatible 100/10Base-T interface
- **Serial ports:** Two RS-232 serial ports
- **Keyboard and PS/2 mouse:** Supports standard PC/AT keyboard and PS/2 mouse
- **Power connector:** 4-pin mini power connector

Mechanical and environmental

- **Power supply voltage:** +5 V (4.75 ~ 5.25 V)
- **Max. power requirements:** +5 V @ 1.5 A
- **Operating temperature:** 0 ~ 60° C (32 ~ 140° F)
- **Board size:** 68 x 100 mm
- **Weight:** 0.05 kg (0.11 lb)

4.3 Board layout: dimensions



4.4 Jumpers and connectors

On-board connectors link to external devices such as hard disk drives, keyboards, floppy drives, and so on. In addition, the board has jumpers for configuring your board for specific applications.

The table below lists the function of each of the board's jumpers and connectors. Later sections in this chapter give detailed information on each jumper setting, and instructions for connecting external devices to your card.

Table 4-1: Jumpers and connectors

Name	Function
CN1	PCI connector
CN2	CompactFlash socket
CN3	SODIMM gold finger (ISA/HDD/FDD/parallel/power)
CN4	I/O connector (LAN/VGA/RS-232/KB/mouse)
CN5	Power connector
J2	Clear CMOS
J3	Fan connector (reserved)

4.5 Board layout: jumper/connector locations

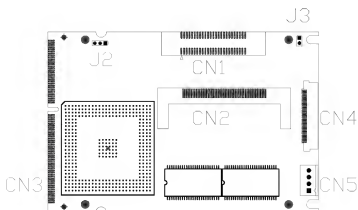


Figure 4-1: Board layout: jumper/connector locations

4.6 Safety precautions

Warning! *Always completely disconnect the power cord from your chassis whenever you are working on it. Do not make connections while the power is on because sensitive electronic components can be damaged by the sudden rush of power. Only experienced electronics personnel should open the PC chassis.*



Caution! *Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.*



4.7 Setting jumpers

You may configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electrical switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper, you connect the pins with the clip. To "open" a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.



The jumper settings are schematically depicted in this manual as follows:



A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

Generally, you simply need a standard cable to make most connections.

4.7.1 Clear CMOS (J2)

This jumper is used to erase CMOS data and reset system BIOS information.

The procedure for clearing CMOS is:

1. Turn off the system.
2. Short pin 2 and pin 3.
3. Turn on the system. The CMOS is now cleared.
4. Turn off the system. Short pin 1 and pin 2.
5. Turn on the system. The BIOS is now reset to its default setting.

Table 4-2: Clear CMOS (J2)

Function	1-2	2-3
Protect*	Closed	Open
Clear CMOS	Open	Closed

* default setting

4.8 CompactFlash interface (CN2)

This socket accepts an IDE-compatible CompactFlash memory card.

The CompactFlash interface uses a primary IDE channel, which should be set as the master channel.

4.9 ISA/IDE/floppy drive/parallel port (CN3)

The CPC-2245N provides a +5 V 16-bit ISA bus, one IDE channel (support two IDE devices), one parallel interface and one floppy interface (support two floppy drives). All these are provided via a 144-pin SODIMM gold finger (CN3), which can be plugged into a DODIMM socket on the user's system board. Users can choose suitable positions on their system board for their HDD, FDD or parallel connectors.

The floppy interface and parallel interface share the same pin assignment, so they cannot be used simultaneously. Users can select either an FDD or parallel port, by referring to their BIOS setup manual.

Table 4-3: ISA/IDE/floppy drive/parallel port connector (CN3)

Pin	Signal	Bus	Pin	Signal	Bus
1	+5 V	POWER	73	+5 V	POWER
2	ZW	ISA	74	RESET	IDE
3	SA18	ISA	75	RSTDRV	ISA
4	SA19	ISA	76	IRQ3	ISA
5	+5 V	POWER	77	GND	POWER
6	+5 V	POWER	78	DACK7	ISA
7	+5 V	POWER	79	DACK6	ISA
8	TC	ISA	80	DACK5	ISA
9	GND	POWER	81	DACK3	ISA
10	GND	POWER	82	DACK2	ISA
11	GND	POWER	83	DACK1	ISA
12	GND	POWER	84	DACK0	ISA
13	GND	POWER	85	HDCS0	IDE
14	GND	POWER	86	HDCS1	IDE
15	GND	POWER	87	GND	POWER
16	GND	POWER	88	IRQ7	ISA
17	IRQ6	ISA	89	IRQ9	ISA
18	IRQ5	ISA	90	IRQ10	ISA
19	IRQ4	ISA	91	IRQ11	ISA
20	SA10	ISA	92	SA11	ISA
21	SA9	ISA	93	SA8	ISA
22	SA14	ISA	94	SA13	ISA
23	SA17	ISA	95	SA16	ISA
24	SA12	ISA	96	SA15	ISA
25	IRQ12	ISA	97	IRQ15	ISA
26	SYSCLK	ISA	98	IRQ14	ISA
27	DRQ3	ISA	99	DRQ2	ISA
28	OSC (14 MHz)	ISA	100	DRQ5	ISA
29	DRQ1	ISA	101	DRQ6	ISA
30	DRQ0	ISA	102	DRQ7	ISA
31	HDACK	IDE	103	HDDRQ	IDE
32	HDIOW	IDE	104	HDIRQ	IDE
33	LA17	ISA	105	HDIOR	IDE
34	LA19	ISA	106	LA20	ISA
35	LA22	ISA	107	LA18	ISA

36	SA0	ISA	108	LA21	ISA
37	LA23	ISA	109	SA1	ISA
38	SA2	ISA	110	SA4	ISA
39	SA6	ISA	111	SA3	ISA
40	HDD0	IDE	112	SA7	ISA
41	HDD8	IDE	113	SA5	ISA
42	HDD2	IDE	114	HDD11	IDE
43	HDD1	IDE	115	HDD3	IDE
44	HDD6	IDE	116	HDD5	IDE
45	HDD10	IDE	117	HDD4	IDE
46	HDD7	IDE	118	HDD9	IDE
47	HDD14	IDE	119	HDD15	IDE
48	HDD13	IDE	120	HDD12	IDE
49	SD8	ISA	121	SD0	ISA
50	SD10	ISA	122	SD2	ISA
51	SD11	ISA	123	SD3	ISA
52	SD9	ISA	124	SD4	ISA
53	SD14	ISA	125	SD1	ISA
54	SD13	ISA	126	SD6	ISA
55	SD12	ISA	127	SD7	ISA
56	BALE	ISA	128	SD5	ISA
57	SD15	ISA	129	IOCHRDY	ISA
58	SMEMR	ISA	130	MEMW	ISA
59	SBHE	ISA	131	IOR	ISA
60	MEMR	ISA	132	MASTER	ISA
61	IOCS16	ISA	133	SMEMW	ISA
62	IOCHCK	ISA	134	MEMCS16	ISA
63	REFRESH	ISA	135	IOW	ISA
64	ACK	PRT	136	AEN	ISA
65	PE	PRT	137	BUSY	PRT
66	PD6	PRT	138	PD5	PRT
67	PD4	PRT	139	PD3	PRT
68	PD2	PRT	140	PD1	PRT
69	PD0	PRT	141	AUTOFD	PRT
70	STROBE	PRT	142	ERR	PRT
71	INIT	PRT	143	PD7	PRT
72	SLCTIN	PRT	144	SLCT	PRT

4.9.1 ISA bus

Table 4-4: ISA bus - CN3 cross reference table (ISA pin A)

ISA bus Pin	Signal	CN3 Pin	Signal
A1	I/O CHCK	62	IOCHCK
A2	SD7	127	SD7
A3	SD6	126	SD6
A4	SD5	128	SD5
A5	SD4	124	SD4
A6	SD3	123	SD3
A7	SD2	122	SD2
A8	SD1	125	SD1
A9	SD0	121	SD0
A10	IOCHRDY	129	IOCHRDY
A11	AEN	136	AEN
A12	SA19	4	SA19
A13	SA18	3	SA18
A14	SA17	23	SA17
A15	SA16	95	SA16
A16	SA15	96	SA15
A17	SA14	22	SA14
A18	SA13	94	SA13
A19	SA12	24	SA12
A20	SA11	92	SA11
A21	SA10	20	SA10
A22	SA9	21	SA9
A23	SA8	93	SA8
A24	SA7	112	SA7
A25	SA6	39	SA6
A26	SA5	113	SA5
A27	SA4	110	SA4
A28	SA3	111	SA3
A29	SA2	38	SA2
A30	SA1	109	SA1
A31	SA0	36	SA0

Table 4-5: ISA bus - CN3 cross reference table (ISA bus pin B)

ISA bus Pin	Signal	CN3 Pin	Signal
B1	GND	9	GND
B2	RSTDRV	75	RSTDRV
B3	+5 V	1	+5 V
B4	IRQ9	89	IRQ9
B5	-5 V	-	-
B6	DRQ2	99	DRQ2
B7	-12 V	-	-
B8	0 WS	2	ZW
B9	+12 V	-	-
B10	GND	10	GND
B11	SMEMW	133	SMEMW
B12	SMEMR	58	SMEMR
B13	IOW	135	IOW
B14	IOR	131	IOR
B15	DACK3	81	DACK3
B16	DRQ3	27	DRQ3
B17	DACK1	83	DACK1
B18	DRQ1	29	DRQ1
B19	REFRESH	63	REFRESH
B20	CLK	26	SYSCLK
B21	IRQ7	88	IRQ7
B22	IRQ6	17	IRQ6
B23	IRQ5	18	IRQ5
B24	IRQ4	19	IRQ4
B25	IRQ3	76	IRQ3
B26	DACK2	82	DACK2
B27	T/C	8	TC
B28	BALE	56	BALE
B29	+5 V	73	+5 V
B30	OSC	28	OSC (14 MHz)
B31	GND	11	GND

Table 4-6: ISA bus - CN3 cross reference table (ISA bus pin C)

ISA bus		CN3	
Pin	Signal	Pin	Signal
C1	SBHE	59	SBHE
C2	LA23	37	LA23
C3	LA22	35	LA22
C4	LA21	108	LA21
C5	LA20	106	LA20
C6	LA19	34	LA19
C7	LA18	107	LA18
C8	LA17	33	LA17
C9	MEMR	60	MEMR
C10	MEMW	130	MEMW
C11	SD8	49	SD8
C12	SD9	52	SD9
C13	SD10	50	SD10
C14	SD11	51	SD11
C15	SD12	55	SD12
C16	SD13	54	SD13
C17	SD14	53	SD14
C18	SD15	57	SD15

Table 4-7: ISA bus - CN3 cross reference table (IDE pin D)

ISA bus Pin	Signal	CN3 Pin	Signal
D1	MEMCS16	134	MEMCS16
D2	I/OCS16	61	I/OCS16
D3	IRQ10	90	IRQ10
D4	IRQ11	91	IRQ11
D5	IRQ12	25	IRQ12
D6	IRQ15	97	IRQ15
D7	IRQ14	98	IRQ14
D8	DACK0	84	DACK0
D9	DRQ0	30	DRQ0
D10	DACK5	80	DACK5
D11	DRQ5	100	DRQ5
D12	DACK6	79	DACK6
D13	DRQ6	101	DRQ6
D14	DACK7	78	DACK7
D15	DRQ7	102	DRQ7
D16	+5 V	5	+5 V
D17	MASTER	132	MASTER
D18	GND	12	GND

4.9.2 IDE interface

Users can attach two IDE devices to the IDE channel, one drive must be set as the master and another as the slave. You may do this by setting the jumpers on the drives. Refer to the documentation that came with your drive for more information.

A jumper diagram usually appears on the top side of a hard disk drive.

IDE hard drive connector

Table 4-8: IDE hard drive connector

IDE connector Pin Signal	CN3 Pin Signal	IDE connector Pin Signal	CN3 Pin Signal
1 IDE RESET	74 RESET	2 GND	13 GND
3 DATA 7 (*2)	46 HDD7	4 DATA 8 (*2)	41 HDD8
5 DATA 6 (*2)	44 HDD6	6 DATA 9 (*2)	118 HDD9
7 DATA 5 (*2)	116 HDD5	8 DATA 10 (*2)	45 HDD10
9 DATA 4 (*2)	117 HDD4	10 DATA 11 (*2)	114 HDD11
11 DATA 3 (*2)	115 HDD3	12 DATA 12 (*2)	120 HDD12
13 DATA 2 (*2)	42 HDD2	14 DATA 13 (*2)	48 HDD13
15 DATA 1 (*2)	43 HDD1	16 DATA 14 (*2)	47 HDD14
17 DATA 0 (*2)	40 HDD0	18 DATA 15 (*2)	119 HDD15
19 SIGNAL GND	14 GND	20 N/C	- -
21 DMA REQUEST	103 HDDRO	22 GND	14 GND
23 IO WRITE (*2)	32 HDIOW	24 GND	14 GND
25 IO READ (*2)	105 HDIOR	26 GND	15 GND
27 IO CHANNEL READY	129 IOCHRDY	28 GND (*1)	15 GND
29 HDACK	31 HDACK	30 GND	16 GND
31 IRQ	104 HDIRO	32 N/C	- -
33 ADDR 1	107 LA18	34 N/C	- -
35 ADDR 0	33 LA17	36 ADDR 2	- -
37 HARD DISK SELECT 0 (*2)	85 HDCS0	38 HARD DISK SELECT 1 (*2)	86 HDCS1
39 IDE ACTIVE		40 GND	16 -
41 VCC	6 +5 V	42 VCC	6 +5 V
43 GND	16 GND	44 N/C	- -

Note : IDE pin 28 must pull 470 ohms resistor to GND.

Note : 33 ohms damping resistors is recommended to connect near IDE connector. Please refer to Fig. 2-2 below.

Note : We do not recommend connection to the following IDE HDD models of Seagate: ST 31276A, ST 31720A, ST 32531A, ST 33240A or ST 34340A

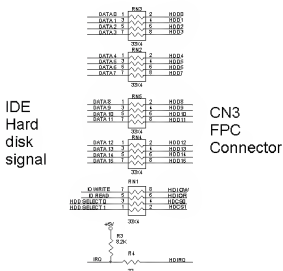


Figure 4-2: Damping resistor

4.9.3 Floppy drive

Users can attach up to two floppy disk drives to the CPC-2245N via a SODIMM socket. The CPC-2245N supports any combination of 5.25" (360 KB / 1.2 MB) and/or 3.5" (720 KB / 1.44/2.88 MB) drives.

The following table lists the pin assignments for the floppy disk connector:

Table 4-9: Floppy drive connector

FDD connctr. CN3				FDD connector		CN3	
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	9	GND	2	High density	141	AUTOFD
3	GND	9	GND	4	N/C		
5	GND	10	GND	6	N/C		
7	GND	10	GND	8	Index	69	PD0
9	GND	11	GND	10	Motor enable A	66	PD6
11	GND	11	GND	12	Driver select B	64	ACK
13	GND	12	GND	14	Driver select A	143	PD7
15	GND	12	GND	16	Motor enable B	137	BUSY
17	GND	13	GND	18	Direction	71	INIT
19	GND	13	GND	20	Step pulse	72	SLCTIN
21	GND	14	GND	22	Write data	65	PE
23	GND	14	GND	24	Write enable	144	SLCT
25	GND	15	GND	26	Track 0	140	PD1
27	GND	15	GND	28	Write protect	68	PD2
29	GND	16	GND	30	Read data	139	PD3
31	GND	16	GND	32	Select head	142	ERR
33	GND	9	GND	34	Disk change	67	PD4

4.9.4 Parallel port

The parallel port is normally used to connect the CPU card to a printer through a DB25 connector. The CPC-2245N includes an on-board parallel port, accessed through a SO. DIMM golden finger. The parallel port is designated as LPT1 and can be disabled or changed to LPT2 or LPT3 in the BIOS setup manual.

Table 4-10: Parallel port connector

Printer port	CN3	Printer port	CN3
Pin	Signal	Pin	Signal
1	/STROBE	70	STROBE
2	DO	69	PD0
3	D1	140	PD1
4	D2	68	PD2
5	D3	139	PD3
6	D4	67	PD4
7	D5	138	PD5
8	D6	66	PD6
9	D7	143	PD7
10	\ACK	64	ACK
11	BUSY	137	BUSY
12	PE	65	PE
13	SLCT	144	SLCT

4.10 VGA/LAN/serial ports/keyboard/mouse (CN4)

The CPC-2245N provides a VGA interface, a 10/100 Base-T Ethernet, two RS-232 serial ports, one keyboard and one PS2 mouse through a 40-pins FPC connector (CN4). User can design their FPC cable for connecting CPC-2245N's FPC connector to user's system board. User can choose suitable position to layout VGA, LAN, COM port, Keyboard and mouse connector on user's system board.

Table 4-11: FPC connector (CN4)

Pin	Signal	Pin	Signal
1	GND	21	DSR2
2	KBVCC	22	RX2
3	EXT RESET	23	CD2
4	DDC1	24	TX2
5	DDC0	25	RI2
6	V SYNC	26	CTS2
7	H SYNC	27	RTS2
8	BLUE	28	DTR2
9	GREEN	29	KBVCC
10	RED	30	MSDT
11	KBVCC	31	KBDT
12	GND	32	KBCK
13	RI1	33	MSCK
14	CTS1	34	GND
15	RTS1	35	TPT-
16	DTR1	36	TPT+
17	TX1	37	GND
18	CD1	38	TPR-
19	RX1	39	TPR+
20	DSR1	40	GND

4.10.1 VGA Interface

The VGA connector is a 15-pin D-SUB connector. Users can follow a transfer table to layout these VGA signals to a standard 15-pin D-SUB connector.



Table 4-12: VGA interface

VGA		CN4		VGA		CN4	
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	RED	10	RED	9	Vcc	2	KBVCC
2	GREEN	9	GREEN	10	GND	1	GND
3	BLUE	8	BLUE	11	N/C	-	-
4	N/C	-	-	12	SDT	5	DDC0
5	GND	1	GND	13	H-SYNC	7	H SYNC
6	GND	1	GND	14	V-SYNC	6	V SYNC
7	GND	12	GND	15	SCK	4	DDC1
8	GND	12	GND				

4.10.2 Ethernet configuration

The CPC-2245N is equipped with a high performance 32-bit PCI-bus Fast Ethernet interface that are fully compliant with IEEE 802.3u 10/100Base-T specifications. Ethernet connector is a RJ-45 jack. User can follow a transfer table to connect Ethernet signals to a standard RJ-45 connector.



Table 4-13: Ethernet configuration

RJ-45		CN4		RJ-45		CN4	
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	TD+	36	TPT+	2	TD -	35	TPT-
3	RD+	39	TPR+	4	NC	-	-
5	NC	-	-	6	RD-	38	TPR-
7	NC	-	-	8	NC	-	-

4.10.3 Keyboard and PS/2 mouse connector

The CPC-2245N provides a keyboard and PS2 mouse interface through a 40-pin FPC connector (CN4) for connection of PS/2 keyboard and PS/2 mouse.

In most cases, especially in embedded applications, a keyboard is not used. The standard PC/AT BIOS will report an error or fail during power-on self-test (POST) after a reset if the keyboard is not present. The CPC-2245N's BIOS "Standard CMOS Features" allows you to select "Halt on" under the "All, but keyboard" or "All, but disk/key" selection. This allows no-keyboard operation in embedded system applications without the system halting under POST (power on self test).

Table 4-14: PS/2 keyboard connector

PS/2 Keyboard		CN4		PS/2 Keyboard		CN4	
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	KB_Data	31	KBDT	4	Vcc	29	KBVCC
2	NC	-	-	5	KBCLK	32	KBCK
3	GND	34	GND	6	NC	-	-

Table 4-15: PS/2 mouse connector

PS/2 Mouse		CN4		PS/2 Mouse		CN4	
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	MDATA	30	MSDT	4	Vcc	29	KBVCC
2	NC	-	-	5	MCLK	33	MSCK
3	GND	34	GND	6	NC	-	-



4.10.4 Serial ports

The CPC-2245N offers two serial ports: COM1 and COM2, both in RS-232. These ports let you connect to serial devices (a mouse, printers, etc.) or a communication network.

You can select the address for each port (For example, 3F8H [COM1], 2F8H [COM2]) or disable it, using the BIOS Advanced Setup program. Different devices implement the RS-232 standard in different ways. If you are having problems with a serial device, be sure to check the pin assignments for the connector.

The IRQ and address range for both ports are fixed. However, if you wish to disable the port or change these parameters later, you can do this in the system BIOS setup. The table below shows the settings for the CPC-2245N board's ports:

Table 4-16: Serial port default settings

Port	Address	Default
COM1	3F8, 2F8, 3E8, 2E8	3F8/IRQ4
COM2	3F8, 2F8, 3E8, 2E8	2F8/IRQ3

The following table shows the pin assignments for the card's RS-232 port:



Table 4-17: COM1 RS-232 serial port connector

RS-232		CN4		RS-232		CN4	
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	DCD	18	CD1	6	DSR	20	DSR1
2	RX	19	RX1	7	RTS	15	RTS1
3	TX	17	TX1	8	CTS	14	CTS1
4	DTR	16	DTR1	9	RI	13	RI1
5	GND	37	GND				

Table 4-18: COM2 RS-232 serial port connector

RS-232		CN4		RS-232		CN4	
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	DCD	23	CD2	6	DSR	21	DSR2
2	RX	22	RX2	7	RTS	27	RTS2
3	TX	24	TX2	8	CTS	26	CTS2
4	DTR	28	DTR2	9	RI	25	RI2
5	GND	40	GND				

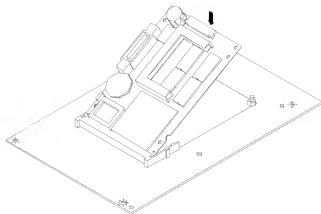
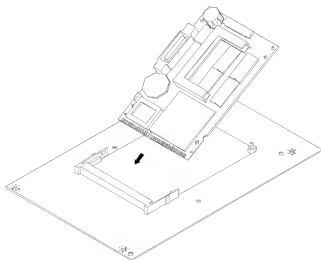
4.11 Power supply connector (CN5)

In single board computer without carrier applications, user may connect a power directly to the CPC-2245N board through CN5. See the following table for its pin assignments:

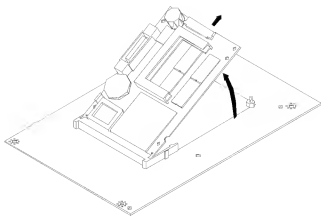
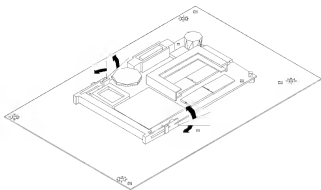
Table 4-19: Power supply connector (CN5)

Pin	Function
1	NC
2	GND
3	GND
4	+5 V

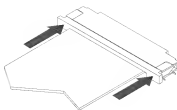
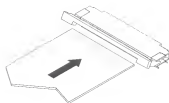
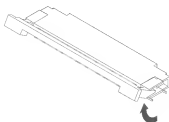
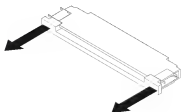
4.12 Card installation



4.13 Card removal



4.14 FPC cable installation



CHAPTER 5

CPC-2520 VGA/LCD Control Board

This chapter provides:

- Background information such as card specification and board layout of CPC-2520.
- The installation procedures for CPC-2520 hardware, including instructions on setting jumpers and connecting peripherals, switches and indicators. Be sure to read all safety precautions before you begin the installation procedure.

5.1 Introduction

The CPC-2520 is an extension VGA/LCD module for the CPC-2245 mini biscuit PC. The CPC-2520 uses a C&T 69000 chipset for its PCI/SVGA controller. It supports many popular LCD, EL, and gas plasma flat panel displays and conventional analog CRT monitors. The 69000 VGA BIOS supports monochrome LCD, EL, color TFT and STN LCD flat panel displays. In addition, it also supports interlaced and non-interlaced analog monitors (color and monochrome VGA) in high-resolution modes while maintaining complete IBM VGA compatibility. Digital monitors (i.e. MDA, CGA, and EGA) are NOT supported. Multiple frequency (multi-sync) monitors are handled as if they were analog monitors.

With on-board 2 MB display memory, the VGA controller can drive CRT displays or color panel displays with resolutions up to 1024 x 768 at 64 K colors.

CRT and panel displays can be used simultaneously. The CPC-2520 can be set in one of three configurations: on a CRT, on a flat panel display, or on both simultaneously. The system is initially set to simultaneous display mode.

5.2 Specifications

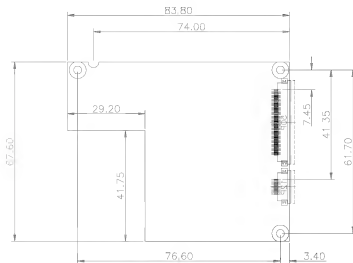
General

- Flat panel VGA interface
- **Chipset:** C&T 69000 VGA controller with Windows accelerator
- **Display memory:** 2 MB SDRAM in built-in chip
- **Display output:**
50-pin FPC connector for flat panel interface
12-pin FPC connector for VGA interface
- **Display type:** Supports CRT and flat panel (TFT, DSTN, and mono) displays. Can display both CRT and flat panel simultaneously
- **Resolution:** 640 x 480 @ 16 M colors
800 x 600 @ 16 M colors
1024 x 768 @ 64 K colors

Mechanical and environmental

- **Power supply voltage:** +5 V (4.75 V ~ 5.25 V)
- **Max. power requirements:** +5 V @ 0.8 A
- **Operating temperature:** 0 ~ 60° C (32 ~ 140° F)
- **Board size:** 68 x 100 mm (2.7" x 3.9")
- **Weight:** 0.05 kg (0.11 lb)

5.3 Board layout: dimensions



5.4 Jumpers and connectors

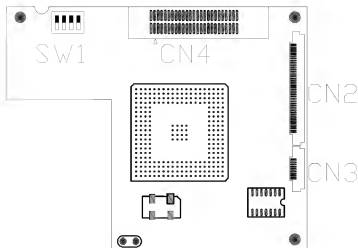
On-board connectors link to external devices such as hard disk drives, keyboards, or floppy drives, etc. In addition, the board has jumpers for configuring your board for specific applications.

The table below lists the function of each of the board's jumpers and connectors. Later sections in this chapter give detailed information on each jumper setting, and gives instructions for connecting external devices to your card.

Table 5-1: Jumpers and connectors

Number	Function
SW1	LCD panel type setting
CN1	Reserved for VGA testing
CN2	LCD display connector
CN3	VGA display connector
CN4	PCI bus

5.5 Board layout: jumper/connector locations



5.6 Safety precautions

Warning! *Always completely disconnect the power cord from your chassis whenever you are working on it. Do not make connections while the power is on because sensitive electronic components can be damaged by the sudden rush of power. Only experienced electronics personnel should open the PC chassis.*



Caution! *Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.*



5.7 Jumper settings

You configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper you connect the pins with the clip. To open a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2 or 2 and 3.



Open



Closed



Closed 2-3

A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representatives before you make any changes.

5.8 LCD panel select (SW1)

Panel #	SW1				Panel Type
	A	B	C	D	
1	ON	ON	ON	ON	1024 x 768 DSTN
2	OFF	ON	ON	ON	1280 x 1024 TFT
3	ON	OFF	ON	ON	640 x 480 DSTN
4	OFF	OFF	ON	ON	800 x 600 DST
5	ON	ON	OFF	ON	640 x 480 Sharp TFT
6	OFF	ON	OFF	ON	640 x 480 18-bit TFT
7	ON	OFF	OFF	ON	1024 x 768 36-bit TFT
8	OFF	OFF	OFF	ON	800 x 600 TFT
9	ON	ON	ON	OFF	800 x 600 TFT (large BIOS only)
10	OFF	ON	ON	OFF	800 x 600 TFT (large BIOS only)
11	ON	OFF	ON	OFF	800 x 600 DSTN (large BIOS only)
12	OFF	OFF	ON	OFF	800 x 600 DSTN (large BIOS only)
13	ON	ON	OFF	OFF	1024 x 768 TFT (large BIOS only)
14	OFF	ON	OFF	OFF	1280 x 1024 DSTN (large BIOS only)
15	ON	OFF	OFF	OFF	1024 x 600 DSTN (large BIOS only)
16	OFF	OFF	OFF	OFF	1024 x 600 TFT (large BIOS only)

5.9 Display connectors (CN2, CN3)

The CPC-2520 PCI SVGA interface can drive conventional CRT display and is capable of driving a wide range of flat display, including electroluminescent (EL), gas plasma, passive LCD, and active LCD displays. The card has two connectors to support these display, one for CRT VGA monitor and one for flat panel displays.

5.10 LCD display connector (CN2)

LCD display connector on CPC-2520 is a 50-pin FPC connector. The CPC-2520 supports up to 36 bits LCD panel.

Table 5-2: LCD display connector (CN2)

Pin	Signal	Pin	Signal
1	ENAVEE	26	P15
2	LP	27	P16
3	ENAVDD	28	P17
4	FLM	29	P18
5	SHIFT CLK	30	P19
6	SHIFT CLK-	31	GND
7	M	32	P20
8	ENABKL	33	P21
9	GND	34	P22
10	P0	35	P23
11	P1	36	P24
12	P2	37	P25
13	P3	38	P26
14	P4	39	P27
15	P5	40	GND
16	P6	41	P28
17	P7	42	P29
18	GND	43	P30
19	P8	44	P31
20	P9	45	P32
21	P10	46	P33
22	P11	47	P34
23	P12	48	P35
24	P13	49	GND
25	P14	50	GND

Note: The model number of the CN2 socket is IL-FPR-50S-HF (JAE Co., Ltd.)

5.11 VGA display connector (CN3)

VGA display connector on CPC-2520 is a 12-pin FPC connector, these VGA signals can be connected to client's system board through a FPC cable. Client can design this cable by referring to Cable layout diagram in chapter of design guide.

Table 5-3: VGA display connector (CN3)

Pin	Signal
1	GND
2	+5V
3	+5V
4	GND
5	H SYNC
6	DDC1
7	V SYNC
8	DDC0
9	BLUE
10	RED
11	GREEN
12	GND

Note: *The model number of the CN3 socket is IL-FPR-12S-HFC (JAE Co., Ltd.)*

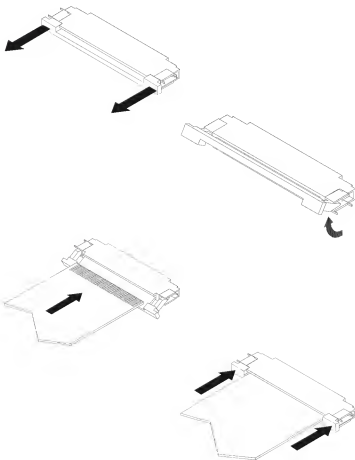
The VGA connector is a 15-pin D-SUB connector. User can follow a transfer table to layout these VGA signals to a standard 15-pin D-SUB connector.



Table 5-4: VGA display connector (CN3)

VGA		CN3		VGA		CN3	
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	RED	10	RED	9	Vcc	2, 3	+V
2	GREEN	11	GREEN	10	GND	4	GND
3	BLUE	9	BLUE	11	N/C	-	-
4	N/C	-	-	12	SDT	8	DDC0
5	GND	1	GND	13	H-SYNC	5	H SYNC
6	GND	1	GND	14	V-SYNC	7	V SYNC
7	GND	12	GND	15	SCK	6	DDC1
8	GND	12	GND				

5.12 FPC cable installation



CHAPTER 6

Networking Communication

This chapter describes the ways to get your HMI-640S connected to the host PC.

Sections include:

- Introduction
- Networking via LAN
- Networking via RS-232
- Simple Networking via a Hub

6.1 Introduction

The HMI-640S is designed as a networking gadget that readily connect itself to the host PC either via existing LAN or a RS-232 interface. Its network capability makes it nothing less than a powerful platform for any application that demands networking communication or remote file transfer. The following sections will guide you through the networking steps for HMI-640.

6.2 Networking via LAN

Ethernet has been so predominant in LANs that we come to regard it as the *de facto* standard for network communication within LANs. The HMI-640S takes advantage of Ethernet networking to connect to a host PC for convenient network communication and file transfer.

Please follow the procedure described below to set up network connection between HMI-640S and host PC via Ethernet network:

1. Before connecting to LAN, first make sure you have properly set up your host PC on a Ethernet LAN running TCP/IP networking protocol. If you have not installed the TCP/IP network protocol on your host PC, you must install it first before joining the host PC to Ethernet LAN.
2. Make sure your HMI-640S is running an OS that has its TCP/IP network protocol enabled.

Note: *If you use a CompactFlash drive which is pre-installed with Windows CE or other network-enabling software, your HMI-640S is ready for TCP/IP networking. You don't have to install other components to run TCP/IP networking.*

3. Disconnect any power source from your HMI-640S.

Note: *Be sure to power off the HMI-640S before you connect or disconnect any cable.*

4. Use a twisted-pair UTP or STP cable (category 3, 4, 5) to connect the HMI-640S through its RJ-45 port to a hub (or a switch) within the Ethernet LAN, to which your host PC is also connected to.

5. Assign valid IP addresses for your HMI-640S and host PC. If you are joining an existing Intranet, ask your network administrator for valid IP addresses. If you are using a DHCP server on the network, you have just no need to assign IP addresses yourself.

Note: To assign the IP addresses to your machines, just access Start/Settings/Control Panel/Network properties sheet and enter valid IP addresses for your machine.

Note: If your network are using a DHCP server for dynamic IP address assignment, you have then no need to assign by yourself since the IP addresses will be assigned to each networking device once it is connected to the network.

6. Enter the device name for your HMI-640S for network identification.

Note: To assign a device name to your HMI-640S, just access Start/Settings/Control Panel/Network properties sheet and enter the device name for your HMI-640S. You have to reboot your system to make the device name viable on the network.

7. After properly establishing the IP status and the device name of your machine on the network, You must reboot to make it viable on the network.

8. After rebooting is complete, verify that your HMI-640S is functionable within the network.

Note: To verify that your HMI-640S has joined the network and is properly connected with your host PC, just try to access your host PC through the Windows CE Explorer by typing //host_name_of_host_PC in the address bar. Press **Enter** to search for the host PC. If the connection is successful, you can see the network shares that is available from the host PC. Or you can simply "ping" your HMI-640S from your host PC to make sure TCP/IP is working. (e.g. c:\ping IP_address_of_your_HMI-640S or device_name_of_your_HMI-640S)

6.2 Networking via RS-232

RS-232 is a time-honored standard interface for industrial automation. It is very convenient to implement albeit much more limited in its communication distance. The HMI-640S is provided with a RS-232 port, from which it can be connected to your host PC via a NULL modem cable.

Please follow the procedure described below to set up network connection between HMI-640S and host PC via RS-232 interface:

1. Before connecting to RS-232, first make sure your COM port service on the host PC has been enabled.

Note: If you are running Windows 95/98 on the host PC, the **Com** port service should be enabled on default without extra installation of other component. On the other hand, if you are running Windows NT on the host PC, make sure the RAS (i.e. Remote Access Service) service on your host PC system is running properly. If you have not installed the RAS service, you must install it on your system.

2. Use the DB-9 NULL modem cable (that accompanies your HMI-640S) to connect the HMI-640S through its RS-232 port to the COM port of your host PC.

Note: *Be sure to power off the HMI-640S before you connect or disconnect any cable.*

3. Power up your HMI-640S and after the system boot has completed, try access *Start/Programs/Communication/Remote Networking* properties sheet.
4. Click ***Make New Connection*** to pop up a dialog box and choose ***Direct Connection***.
5. Double-click the ***New Connection*** icon to connect to the PC.
6. After you have successfully connected to the host PC, just verify the validity of your RS-232 connection by typing the host name of your host PC in the Address Bar of your Windows CE Explorer. Press ***Enter*** to search for the host PC. If the connection is successful, you can see the network shares that is available from the host PC.

6.3 Simple Networking via a Hub

If you want only to connect your HMI-640S and the host PC through RJ-45 ports, it is required that you use twisted-pair cables to connect both to a central hub. Note that this network configuration is essentially the same with Ethernet despite a configuration of merely two end nodes.

After you have established a proper connection, you can verify the network communication according to the procedure described in the previous section.

Cabling for RS-232 Port

The HMI-640S is equipped with a watchdog timer that resets the CPU if processing comes to a standstill for any reason. This feature ensures system reliability in industrial stand-alone or unmanned environments.

HMI-640S is shipped together with a serial cable (NULL modem cable) for customers to make a direct connection between it and the host PC. Note that off-the-shelf NULL modem cables may not be wired correctly. The following list is the wiring table for this cable:

9-pin NULL Modem Cable:

Remote host serial port connector	Calling system serial port connector	Signal
3	2	Transmit Data
2	3	Receive Data
7	8	Request to Send
8	7	Clear to Send
6,1	4	Data Set Ready and Carrier Detect
5	5	Signal Ground
4	6,1	Data Terminal Ready

25-pin NULL Modem Cable:

Remote host serial port connector	Calling system serial port connector	Signal
2	3	Transmit Data
3	2	Receive Data
4	5	Request to Send
5	4	Clear to Send
6, 8	20	Data Set Ready and Carrier Detect
7	7	Signal Ground
20	6, 8	Data Terminal Ready

APPENDIX **B**

DIP Switch Settings

- Touchscreen Specifications
- Installation
- Running the Setup Program
- Removing the Touchscreen Driver
- Touchscreen Driver Application Interface (API)

B.1 Touchscreen Specifications

The touchscreen is a 4-wire analog resistive type. It is constructed of one glass sheet overlayed with two layers of PET. The PET layers are coated with ITO and are separated by printed spacers. The touchscreen is designed to be activated by the pressure of any stylus.

COM2	DIP Switch Setting
RS-232	4, 6, 8, 10 ON
RS-422	1, 3, 5, 7, 9, 12 ON
RS-485	2, 7, 9, 12 ON